

### Abstract

A system is described for improving engine and vehicle performance by considering the effects of exhaust conditions on catalyst particle growth. Specifically, engine operation is  
5 adjusted to reduce operating in such conditions, and a diagnostic routine is described for determining the effects of any operation that can cause such particle growth. Further, routines are described for controlling various vehicle conditions, such as deceleration fuel shut-off, to reduce  
10 effects of the particle growth on emission performance.